

**CLAIMS**

1. Process for preparing 1,1,1-trifluoro-2,2-dichloroethane (F123) comprising placing 1,1,1-trifluoro-2-chloroethane (F133a) in contact with chlorine, said process  
5 being performed:

- in the presence of HF;
- under temperature conditions, with a contact time and with  $\text{Cl}_2/\text{F133a}$  and  $\text{HF}/\text{F133a}$  molar ratios wherein HF substantially does not react with the F133a and the F123  
10 formed, and promotes selectivity towards F123; and

- in the presence of a bulk catalyst consisting of aluminium fluoride or of a mixture of aluminium fluoride and alumina, or of a catalyst based on iron, or on iron and nickel, supported on aluminium fluoride or on a mixture of  
15 aluminium fluoride and alumina.

2. Process according to Claim 1, wherein the temperature is between 150°C and 320°C.

3. Process according to Claim 2, wherein the temperature is between 250°C and 300°C.

20 4. Process according to Claim 1, wherein the  $\text{Cl}_2/\text{F133a}$  molar ratio is between 0.01 and 0.50.

5. Process according to Claim 4, wherein the  $\text{Cl}_2/\text{F133a}$  molar ratio is between 0.1 and 0.3.

25 6. Process according to Claim 1, wherein the  $\text{HF}/\text{F133a}$  molar ratio is between 0.5 and 2.5.

7. Process according to Claim 6, wherein the

HF/F133a molar ratio is between 0.8 and 1.2.

8. Process according to Claim 1, wherein the contact time between F133a,  $\text{Cl}_2$  and HF on the catalyst is between 5 and 100 seconds.

5 9. Process according to Claim 8, wherein the contact time is between 10 and 60 seconds.

10. Process according to Claim 1, wherein the catalyst is a bulk catalyst consisting of aluminium fluoride or a mixture of aluminium fluoride and alumina.

10 11. Process according to Claim 1, wherein the catalyst is a catalyst based on iron supported on aluminium fluoride or on a mixture of aluminium fluoride and alumina.

12. Process according to Claim 11, in wherein the iron content is less than 30% by weight.

15 13. Process according to Claim 1, wherein the catalyst is a catalyst based on iron and nickel supported on aluminium fluoride or on a mixture of aluminium fluoride and alumina.

20 14. Process according to Claim 13, wherein the nickel content of the catalyst is less than 20% by weight.

15. Process according to Claim 1, wherein it is carried out continuously.

25 16. Process according to Claim 1, wherein the starting F133a is obtained by fluorination of trichloroethylene.

17. Process according to Claim 16, wherein the

fluorination of trichloroethylene is performed in the liquid phase under pressure, in the presence of a catalyst based on antimony salts or in the gaseous phase in the presence of a catalyst based on chromium oxide or chromium oxyfluoride.

5           18. Process for preparing pentafluoroethane (F125) by fluorinating F123 as obtained by application of a process according to Claim 1.

10           19. Process according to Claim 18, wherein the F123 is placed in contact with HF in the presence of a catalyst consisting of aluminium fluoride or of a mixture of aluminium fluoride and alumina, or of a catalyst based on iron, or on iron and nickel, supported on aluminium fluoride or on a mixture of aluminium fluoride and alumina.

15           20. Process according to Claim 18, wherein the starting F133a is obtained by fluorination of trichloroethylene or by fluorination of trichloroethylene is performed in the liquid phase under pressure, in the presence of a catalyst based on antimony salts or in the gaseous phase in the presence of a catalyst based on chromium oxide or  
20 chromium oxyfluoride, said process comprising:

- 1) fluorinating trichloroethylene to F133a,
- 2) chlorinating F133a to F123,
- 3) fluorinating F123 to F125.

25           21. Plant for carrying out the process according to Claim 20, wherein it comprises:

for 1):

- a reactor containing the catalyst;
- inlets for trichloroethylene and HF;
- an HCl distillation column;
- a column for separating out F133a + HF from the heavy fractions:

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for 2):

- a chlorination reactor fed with:
  - F133a and HF;
  - chlorine;
- an HCl separation column;
- a column for separating the crude F123 from the unreacted F133a, especially azeotropic HF and unreacted Cl<sub>2</sub>, which are recycled;
- a device to withdraw the excess HF.

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for 3):

- a fluorination reactor, fed with crude F123 originating from a column for separating crude F123 from 2), with HF and optionally with crude F124 recycled from a column;
- at the outlet of the fluorination reactor, the devices for processing the reaction gases intended to recover the HCl formed as byproduct by the reaction and the unconverted HF, and to neutralize the fluorocarbon compounds before distilling them;
- a column for then extracting as the head

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fraction the F125, the tail fraction then being distilled off on a column to give a mixture F124 + F123 purified of its content of heavy fractions, said mixture then being recycled into the reaction to be fluorinated therein into F125.

22. Plant according to Claim 21, wherein it comprises a column for purifying both the crude F123 derived from a column of 2) and the crude mixture F124 + F123 derived from the tail fraction of a column of 3).

23. Process according to Claim 12, wherein the iron content is less than 15%.

24. Process according to Claim 11, wherein the catalyst is a catalyst based on iron and nickel supported on aluminium fluoride or on a mixture of aluminium fluoride and alumina.

25. Process according to Claim 12, wherein the catalyst is a catalyst based on iron and nickel supported on aluminium fluoride or on a mixture of aluminium fluoride and alumina.

26. Process according to Claim 14, wherein the nickel content is less than 15%.